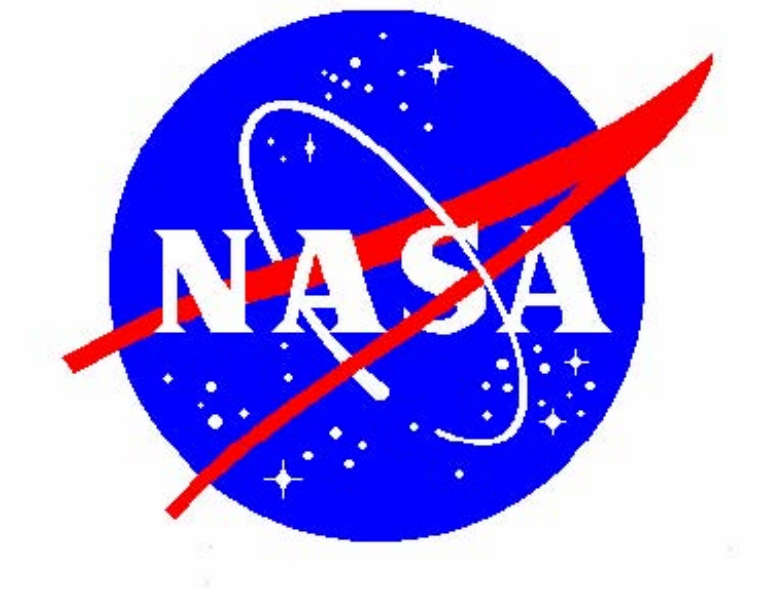
Solicitation Number 3-MAIN-GATE-IMPROVEMENTS-2009

Amendment #2 Attachments



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GLENN RESEARCH CENTER
21000 BROOKPARK ROAD, CLEVELAND, OHIO 44135
February 27, 2009

APPENDIX 1

BACKGROUND

This Proposed Construction Sequence lays out a plan to perform the anticipated Phase 1 construction work in a logical order that achieves the following objectives:

a. Maintains access to the Glenn Research Center during construction
b. Keeps construction personnel and GRC personnel segregated as much as possible.
c. Limits the number of times that GRC staff will have to change traffic patterns.
d. Allows the construction crews room to work.
e. Limits cases where subsequent work might require demolition or rework to completed work.

SUMMARY OF CONSTRUCTION SEQUENCES

This Proposed Construction Sequence calls for all Phase I work to be completed in three "Sequences", labeled A, B, and C. Unless noted otherwise, it is assumed that the previous tasks are completed before a given task can be started (Pre-requisites are identified). The set of drawings that accompany this document show in graphic form the limits of work in the various sequences. In some cases, exact limit lines have some flexibility for ease of construction. Each task is assumed to include the associated placement of underground utilities in the affected area.

PHASE 1- SEQUENCE A

Sequence A contains three task areas that should be completed at the start of the project. In this case, the three tasks are somewhat independent and can be performed simultaneously.

1. TASK A1- Construct Force Main

Description: The force main piping is to be installed from the existing City of Cleveland Manhole north of Brookpark Road in front of the Building 500/501 parking lot, run west to boring location under Brookpark Road and continue south to tie-in to existing Lift Station. As installation nears the intersection of Underpass Road and existing Walcott Road, a short duration road closure of Underpass Road will be required.

Pre-Requisites: None

Road Closures: 3- Underpass Road near Buildings 500/501, Underpass Road at Walcott Road, short turn loop from southbound Walcott Road to Underpass Road.

Normal GRC Entry: From existing Walcott Road to either Taylor Road or Stratton Road.

PHASE 1- SEQUENCE A (cont.)

2. Re-Open Underpass Road

Description: Once force main is run south of Underpass Road, re-open Underpass Road
Pre-Requisites: Completion of Task A1.
Road Closures: None
Normal GRC Entry: From either existing Walcott Road or Underpass Road to either Taylor Road or Walcott Road.

3. TASK A2- Construct Intersection of Taylor Road and Stratton Road

Description: While the connection from existing Walcott Road to Stratton Road is still intact, the intersection of Taylor Road and Walcott Road will be reconstructed. This work must leave the northern entrance to the main hangar parking lot accessible during construction. This work will also include installation of the new traffic signal system.
Pre-Requisites: None
Road Closures: 4- Southern entrance to main hangar parking lot, at entrance from existing Walcott Road to Taylor Road, At western intersection of Stratton Road and existing Walcott Road, and to the south at intersection at Taylor Road and Ames Road
Normal GRC Entry: From either existing Walcott Road or Underpass Road to Walcott Road only.

4. Re-Open Intersection of Taylor Road and Stratton Road

Description: Once Task A2 is completed, re-open just the intersection of Taylor Road and Stratton Road.
Pre-Requisites: Completion of Task A2
Road Closures: Leave entrance from existing Walcott Road to Taylor Road closed for Item B4.
Normal GRC Entry: From either existing Walcott Road or Underpass Road to Walcott Road only.

5. TASK A3- Perform Soil Stabilization at site of New Gatehouse

Description: According to the findings for the Soils Report, the existing soil in the proposed area of the new Gatehouse is good soil, but it is loosely compacted. Before the site can be developed, the soil will need to be stabilized. Stabilization will require removing the soil to a depth of 10 feet in an area of the footprint of the Gatehouse plus 16 feet all around. The soil will be dried and replaced and recompacted to achieve the desired bearing capacity. This work should be done first to clear the area for development work.
Pre-Requisites: None
Road Closures: None
Normal GRC Entry: From either existing Walcott Road or Underpass Road to Walcott Road only.

END OF PHASE 1- SEQUENCE A

PHASE 1- SEQUENCE B

6. TASK B4- Complete Pavement at South End of New Walcott Road

Description: While the connection from existing Walcott Road to Stratton Road is still intact, complete paving work where the southern end of new Walcott Road will connect to Taylor Road. This work must keep the southern entrance to the main hangar parking lot open. The work will include installation of pop-up barriers and wrong way devices south of the new Gatehouse location. Northern extent of the pavement will stop short of the new Gatehouse location to allow room to work on the Gatehouse later.

Pre-Requisites: Completion of Task A2

Road Closures: 3- Northern entrance to main hangar parking lot, at entrance from existing Walcott Road to Taylor Road, at intersection of Taylor Road and Stratton Road.

Normal GRC Entry: From either existing Walcott Road or Underpass Road to Walcott Road only.

7. Re-Open Taylor Road

Description: Once task B4 is completed, Taylor Road can be re-opened. It will now become the primary entrance to the GRC site.

Pre-Requisites: Completion of Task B4

Road Closures: None

Normal GRC Entry: From either existing Walcott Road or Underpass Road to Taylor Road only.

8. TASK B5- Development of Southwest Site

Description: Once Taylor Road has been re-constructed, work can begin on demolition and renovation of the southwestern portion of the site. Once completed, this work will now take the western turn of existing Walcott Road out of service permanently. The work must be staged to leave one of the two entrances to the parking lot northwest of the Administration Building accessible at all times. This can be accomplished by constructing the western portion first while leaving the east entrance in service. Once the western portion is completed, the western entrance can be re-opened, and Walcott permanently closed at the east end.

Pre-Requisites: Completion of Tasks A2 and B4

Road Closures: 5- western end of parking lot(temporary), eastern end of parking lot(temporary), intersection of Walcott Road and Ames Road (temporary), intersection of Taylor Road and Stratton Road, and the eastern connection to existing Walcott Road.

Normal GRC Entry: From either existing Walcott Road or Underpass Road to Taylor Road only.

9. Re-Open Stratton Road

Description: Once Task B5 is complete, Stratton Road can be reopened at Taylor Road and all other road closures removed.
Pre-Requisites: Completion of Task B5
Road Closures: None
Normal GRC Entry: From either existing Walcott Road or Underpass Road to Taylor Road only.

END OF PHASE 1- SEQUENCE B

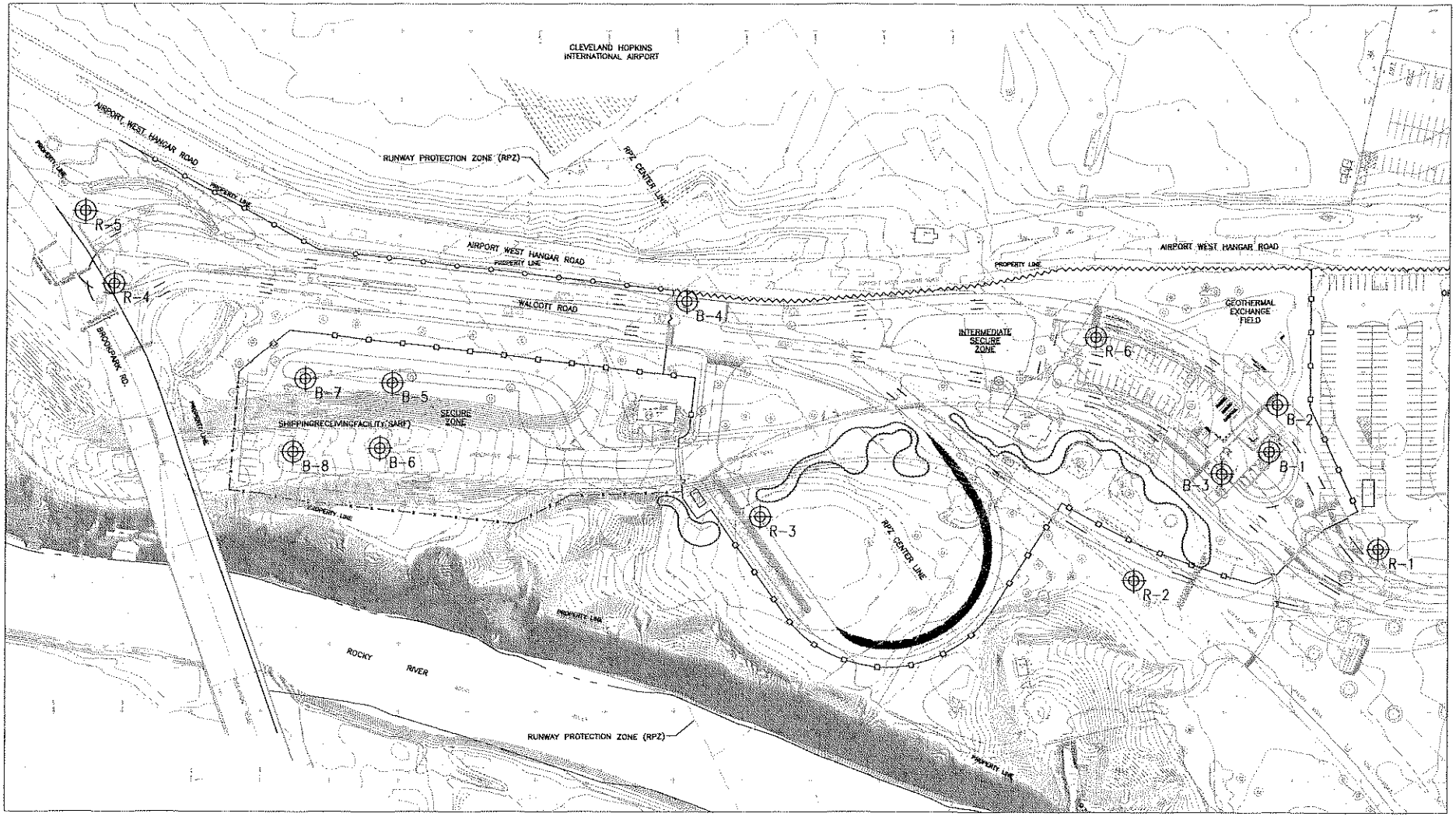
PHASE 1- SEQUENCE C

10. TASK C6- Complete Phase 1 Pavement Work for New Walcott Road

Description: At this point, existing Walcott Road will be closed. The new construction at the intersection of Walcott Road and Brookpark Road can be completed as well as the construction of both northbound and southbound lanes of new Walcott Road to the extent indicated on the drawings. This work also includes installation of crash resistance fencing and three-cable fencing along the eastern property line.
Pre-Requisites: Completion of Phase 1, Sequences A, and B
Road Closures: 3- Both incoming and outbound lanes of Walcott Road at intersection of Brookpark Road and Walcott Road at intersection of Underpass Road. *(Note: An optional fourth road closure could occur at the loop from existing Walcott Road to northbound Underpass Road).*
Normal GRC Entry: From Underpass Road only to Taylor Road only.

END OF PHASE 1- SEQUENCE C AND CONCLUSION OF PHASE 1

APPENDIX 2



B-X – GEOTECHNICAL BORING

APPROXIMATE SITE/BORING LOCATION MAP
NASA-GRC MAIN GATE SECURITY PROJECT
BROOK PARK, CUYAHOGA CO. OHIO

JL07675

DRAWN	REVIEWED	DATE	CALCULATED	NOT TO SCALE
LLC	JX	5/14/08	---	
			CHECKED JX	

1 / 1

BOREHOLE NUMBER

FIELD BOREHOLE LOG

R-1

PROJECT NUMBER:	**JL07675**	DATE BEGUN:	**04/16/08**	DATE COMPLETED:	**04/16/08**
PROJECT NAME:	**NASA GRC Main Gate Security Upgrade**	STATION:	**--**	OFFSET:	**--**
LOCATION:	**Brook Park, Cuyahoga Co., Ohio**	TOTAL DEPTH:	**10.0 (ft)**	SURFACE ELEVATION:	**758.0 (ft)**
CLIENT:	**A.M. Kinney, Inc.**				
DRILLING CO:	**EBD**	WATER LEVELS:			
DRILLING METHOD:	**4-1/2" O.D. SSA**	DURING DRILLING:	**Not Encountered**		
DRILLERS:	**ML**	UPON COMPLETION:	**Not Encountered**		
GEOLOGIST:	**JL**	AFTER COMPLETION:	**N/A**		

DEPTH (ft)	SAMPLE INFORMATION NO.	TYPE	BLOWS/0.5 (ft)	N	DESCRIPTION	DEPTH (ft)	W%	ELEV. (ft)
0.0	1	SS	3-4-5	9	TOPSOIL: With gravel - 12 (in).			
					A-6a: Dark brown, stiff SILT AND CLAY, some sand, little gravel and siltstone / slag fragments, odorless, no reaction with HCl, moist. (FILL)	1.0	15	
	2	ST	REC: 10 (in).	--		2.0	19	
	3	SS	7-11-16	27	A-6b: Brown, very stiff to hard SILTY CLAY, little sand, trace gravel and sandstone / siltstone / granite fragments, odorless, moderate reaction with HCl, homogeneous soil structure, moist. (Possible fill)		15	755
5.0					NOTE: Shelby tube obtained from offset boring.			
	4	SS	9-15-20	35			15	
	5	SS	6-11-17	28			16	750
10.0					TERMINATION DEPTH: 10.0 (FT)			

BOREHOLE NUMBER

FIELD BOREHOLE LOG

R-2

PROJECT NUMBER:	**JL07675**	DATE BEGUN:	**04/16/08**	DATE COMPLETED:	**04/16/08**
PROJECT NAME:	**NASA GRC Main Gate Security Upgrade**	STATION:	**--**	OFFSET:	**--**
LOCATION:	**Brook Park, Cuyahoga Co., Ohio**	TOTAL DEPTH:	**12.0 (ft)**	SURFACE ELEVATION:	**753.8 (ft)**
CLIENT:	**A.M. Kinney, Inc.**				
DRILLING CO:	**EBD**	WATER LEVELS:			
DRILLING METHOD:	**4-1/2" O.D. SSA**	DURING DRILLING:	**Not Encountered**		
DRILLERS:	**ML**	UPON COMPLETION:	**Not Encountered**		
GEOLOGIST:	**JL**	AFTER COMPLETION:	**N/A**		

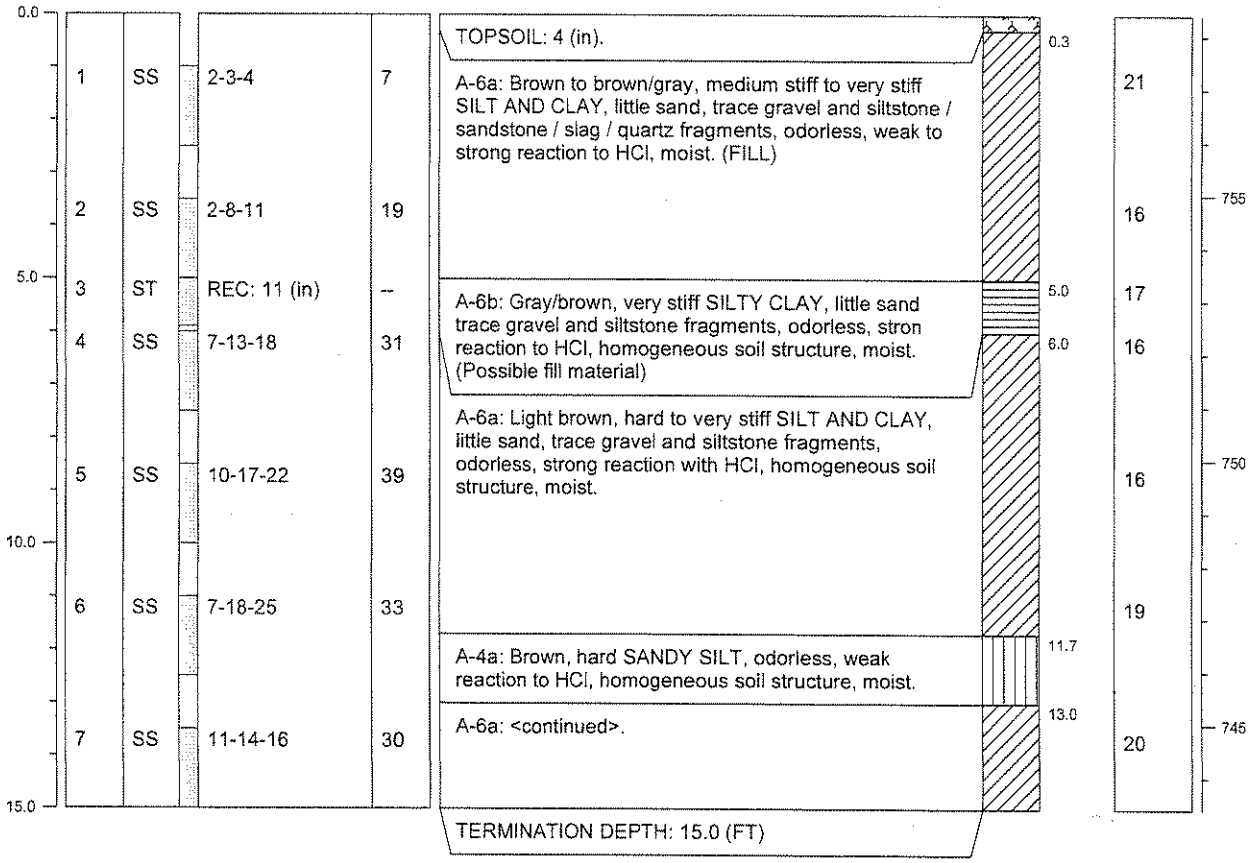
DEPTH (ft)	SAMPLE INFORMATION NO.	TYPE	BLOWS/0.5 (ft)	N	DESCRIPTION	DEPTH (ft)	W%	ELEV. (ft)
0.0	1	SS	1-3-4	7	TOPSOIL: 12 (in).			
					A-6a: Brown, medium stiff SILT AND CLAY, some sand, trace gravel and siltstone / slag / wood fragments, odorless, strong to no reaction with HCl, moist. (FILL)	1.0	19	
	2	SS	1-2-3	5	NOTE: Borehole caved in at 8.5 (ft) upon completion of boring operations.		20	750
5.0					NOTE: Shelby tube obtained from offset boring.			
	3	SS	2-2-3	5			23	
	4	SS	2-2-3	5			22	745
10.0	5	ST	REC: 24 (in).	--	A-7-6: Brown, medium stiff, CLAY, some silt, little sand, trace gravel and siltstone / shale fragments, odorless, no reaction to HCl, moist. (FILL)	10.0	21	
					TERMINATION DEPTH: 12.0 (FT)			

BOREHOLE NUMBER

FIELD BOREHOLE LOG

R-3

PROJECT NUMBER:	**JL07675**	DATE BEGUN:	**04/17/08**	DATE COMPLETED:	**04/17/08**
PROJECT NAME:	**NASA GRC Main Gate Security Upgrade**	STATION:	**--**	OFFSET:	**--**
LOCATION:	**Brook Park, Cuyahoga Co., Ohio**	TOTAL DEPTH:	**15.0 (ft)**	SURFACE ELEVATION:	**758.4 (ft)**
CLIENT:	**A.M. Kinney, Inc.**				
DRILLING CO:	**EBD**	WATER LEVELS:			
DRILLING METHOD:	**4-1/2" O.D. SSA**	DURING DRILLING:	**Not Encountered**		
DRILLERS:	**ML**	UPON COMPLETION:	**Not Encountered**		
GEOLOGIST:	**JL**	AFTER COMPLETION:	**N/A**		

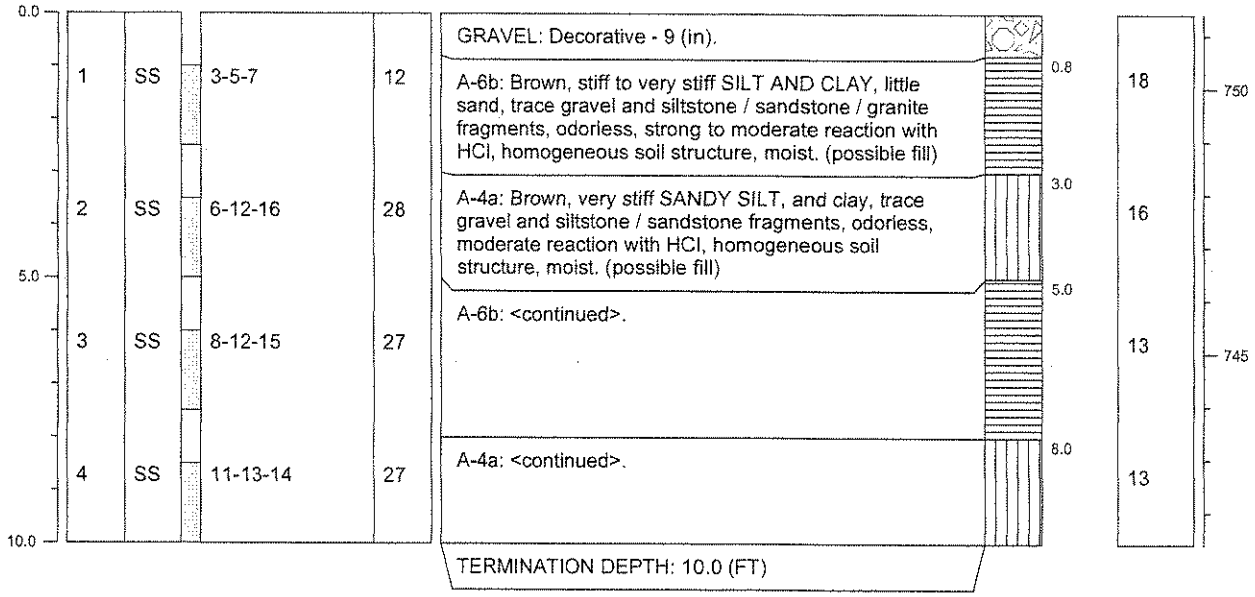


BOREHOLE NUMBER

FIELD BOREHOLE LOG

R-4

PROJECT NUMBER:	**JL07675**	DATE BEGUN:	**04/21/08**	DATE COMPLETED:	**04/21/08**
PROJECT NAME:	**NASA GRC Main Gate Security Upgrade**	STATION:	**--**	OFFSET:	**--**
LOCATION:	**Brook Park, Cuyahoga Co., Ohio**	TOTAL DEPTH:	**10.0 (ft)**	SURFACE ELEVATION:	**751.4 (ft)**
CLIENT:	**A.M. Kinney, Inc.**				
DRILLING CO:	**EBD**	WATER LEVELS:			
DRILLING METHOD:	**4-1/2" O.D. SSA**	DURING DRILLING:	**Not Encountered**		
DRILLERS:	**ML**	UPON COMPLETION:	**Not Encountered**		
GEOLOGIST:	**JL**	AFTER COMPLETION:	**N/A**		



BOREHOLE NUMBER

FIELD BOREHOLE LOG

R-5

PROJECT NUMBER:	**JL07675**	DATE BEGUN:	**04/21/08**	DATE COMPLETED:	**04/21/08**
PROJECT NAME:	**NASA GRC Main Gate Security Upgrade**	STATION:	**--**	OFFSET:	**--**
LOCATION:	**Brook Park, Cuyahoga Co., Ohio**	TOTAL DEPTH:	**10.0 (ft)**	SURFACE ELEVATION:	**752.0 (ft)**
CLIENT:	**A.M. Kinney, Inc.**				
DRILLING CO:	**EBD**	WATER LEVELS:			
DRILLING METHOD:	**4-1/2" O.D. SSA**	DURING DRILLING:	**Not Encountered**		
DRILLERS:	**ML**	UPON COMPLETION:	**Not Encountered**		
GEOLOGIST:	**JL**	AFTER COMPLETION:	**N/A**		

DEPTH (ft)	SAMPLE INFORMATION NO.	TYPE	BLOWS/0.5 (ft)	N	DESCRIPTION	DEPTH (ft)	W%	ELEV. (ft)
0.0	1	SS	3-4-9	13	TOPSOIL: 10 (in).	0.8	16	750
					A-6a: Brown to brown and gray, stiff to hard SILT AND CLAY, little sand, trace gravel and siltstone / sandstone / slag fragments, odorless, moderate to weak reaction with HCl, homogeneous soil structure, moist.			
	2	SS	5-11-24	35	NOTE: Fill material until 3.0 (ft), possible fill from 3.0 to 10.0 (ft).		18	
5.0	3	SS	15-22-28	50			12	745
	4	SS	12-19-23	42			11	
10.0					TERMINATION DEPTH: 10.0 (FT)			

BOREHOLE NUMBER

FIELD BOREHOLE LOG

R-6

PROJECT NUMBER:	**JL07675**	DATE BEGUN:	**04/16/08**	DATE COMPLETED:	**04/16/08**
PROJECT NAME:	**NASA GRC Main Gate Security Upgrade**	STATION:	**--**	OFFSET:	**--**
LOCATION:	**Brook Park, Cuyahoga Co., Ohio**	TOTAL DEPTH:	**10.0 (ft)**	SURFACE ELEVATION:	**754.3 (ft)**
CLIENT:	**A.M. Kinney, Inc.**				
DRILLING CO:	**EBD**	WATER LEVELS:			
DRILLING METHOD:	**4-1/2" O.D. SSA**	DURING DRILLING:	**7.0 (ft)**		
DRILLERS:	**ML**	UPON COMPLETION:	**6.0 (ft)**		
GEOLOGIST:	**JL**	AFTER COMPLETION:	**N/A**		

DEPTH (ft)	SAMPLE INFORMATION NO.	TYPE	BLOWS/0.5 (ft)	N	DESCRIPTION	DEPTH (ft)	W%	ELEV. (ft)
0.0					TOPSOIL: With gravel - 6 (in).	0.5		
	1	SS	2-4-8	12	A-2-6: Brown, medium dense GRAVEL AND LIMESTONE / SILTSTONE / CONCRETE FRAGMENTS WITH SAND, SILT AND CLAY, trace rooting, odorless, strong reaction with HCl, moist. (FILL)	1.1	13	
	2	ST	Rec: 6"	--			12	
	3	SS	6-8-12	20	A-6a: Brown to gray, very stiff SILT AND CLAY, little sand, trace gravel and siltstone fragments, odorless, weak to strong reaction with HCl, homogeneous soil structure, moist.	3.0	17	750
5.0								
	4	SS	9-15-16	31	A-6b: Brown to gray, very stiff to hard SILTY CLAY, little sand, trace gravel and siltstone fragments, odorless, weak to strong reaction with HCl, homogeneous soil structure, moist.		16	
					Note: Shelby tube obtained from offset boring.			
	5	SS	11-21-24	45			10	745
10.0					TERMINATION DEPTH: 10.0 (FT)			

BOREHOLE NUMBER

B-1

FIELD BOREHOLE LOG

PROJECT NUMBER:	**JL07675**	DATE BEGUN:	**04/17/08**	DATE COMPLETED:	**04/17/08**
PROJECT NAME:	**NASA GRC Main Gate Security Upgrade**	STATION:	**--**	OFFSET:	**--**
LOCATION:	**Brook Park, Cuyahoga Co., Ohio**	TOTAL DEPTH:	**30.0 (ft)**	SURFACE ELEVATION:	**757.7 (ft)**
CLIENT:	**A.M. Kinney, Inc.**				
DRILLING CO:	**EBD**	WATER LEVELS:			
DRILLING METHOD:	**4-1/2" O.D. SSA**	DURING DRILLING:	**23.5 (ft)**		
DRILLERS:	**ML**	UPON COMPLETION:	**17.0 (ft)**		
GEOLOGIST:	**JL**	AFTER COMPLETION:	**N/A**		

DEPTH (ft)	SAMPLE INFORMATION NO.	TYPE	BLOWS/0.5 (ft)	N	DESCRIPTION	DEPTH (ft)	W%	ELEV. (ft)
0.0					TOPSOIL: 12 (in).			
	1	SS	2-2-3	5	A-6a: Brown, medium stiff SILT AND CLAY, some sand, little gravel and siltstone / sandstone / slag fragments, odorless, weak reaction with HCl, moist. (FILL)	1.0	16	755
	2	SS	3-4-4	8			17	
5.0	3	SS	2-2-3	5			16	
	4	ST	REC: 18 (in).	--	A-6b: Brown/gray, medium stiff SILTY CLAY, little sand, trace gravel and siltstone / sandstone / slag fragments, odorless, no reaction to HCl, moist. (FILL)	7.0	22	750
10.0	5	SS	2-3-3	6			23	
	6	SS	2-2-3	5			25	745
15.0	7	ST	REC: 20 (in).	--	A-7-6: Gray, very stiff CLAY and silt, trace sand, odorless, no to moderate reaction to HCl, homogeneous soil structure, moist.	17.5	28	740
20.0	8	SS	8-8-8	16			18	
	9T	SS	2-6-8	14	A-4b: Gray, stiff SILT, some clay, trace sand, odorless, strong reaction to HCl, homogeneous soil structure, wet.	21.2	24	735
25.0	9B				A-1-b: Gray, medium dense GRAVEL AND SANDSTONE / SILTSTONE FRAGMENTS WITH SAND, some fines, odorless, strong reaction to HCl, homogeneous soil structure, wet.	24.0	11	
	10	SS	33-36-58	50+	DxSH: DECOMPOSED SHALE, gray, medium hard.	27.7	7	730
30.0					TERMINATION DEPTH: 30.0 (FT)			

BOREHOLE NUMBER

FIELD BOREHOLE LOG

B-2

PROJECT NUMBER:	**JL07675**	DATE BEGUN:	**04/16/08**	DATE COMPLETED:	**04/16/08**
PROJECT NAME:	**NASA GRC Main Gate Security Upgrade**	STATION:	**--**	OFFSET:	**--**
LOCATION:	**Brook Park, Cuyahoga Co., Ohio**	TOTAL DEPTH:	**25.5 (ft)**	SURFACE ELEVATION:	**757.8 (ft)**
CLIENT:	**A.M. Kinney, Inc.**				
DRILLING CO:	**EBD**	WATER LEVELS:			
DRILLING METHOD:	**4-1/2" O.D. SSA**	DURING DRILLING:	**20.5 (ft)**		
DRILLERS:	**ML**	UPON COMPLETION:	**20.0 (ft)**		
GEOLOGIST:	**JL**	AFTER COMPLETION:	**N/A**		

DEPTH (ft)	SAMPLE INFORMATION NO.	TYPE	BLOWS/0.5 (ft)	N	DESCRIPTION	DEPTH (ft)	W%	ELEV. (ft)
0.0					TOPSOIL: 10 (in)			
	1	SS	3-3-4	7	A-6b: Brown to gray/brown, medium stiff SILTY CLAY, some sand, little gravel and slitstone / sandstone / slag fragments, odorless, moderate to weak reaction to HCl, moist. (FILL)	0.8	16	
	2	SS	1-3-5	8			19	755
5.0						5.0		
	3	SS	2-3-4	7	A-6a: Gray/brown, medium stiff SILT AND CLAY, little sand, trace gravel and siltstone / sandstone / shale fragments, odorless, no to weak reaction to HCL, homogeneous soil structure, moist. (Possible Fill)		16	
	4	SS	2-3-4	7			19	750
10.0								
	5	SS	2-2-3	5			19	745
15.0								
	6	SS	2-2-3	5			20	740
20.0								
					A-4a: Gray, stiff SANDY SILT, little clay, trace gravel and siltstone / wood fragments, odorless, weak reaction to HCl, wet.	20.5		735
	7T	SS	5-5-7	12			22	
25.0	7B				A-6a: <continued>.	24.5	12	
					TERMINATION DEPTH: 25.5 (FT)			

BOREHOLE NUMBER

FIELD BOREHOLE LOG

B-3

PROJECT NUMBER:	**JL07675**	DATE BEGUN:	**04/17/08**	DATE COMPLETED:	**04/17/08**
PROJECT NAME:	**NASA GRC Main Gate Security Upgrade**	STATION:	**--**	OFFSET:	**--**
LOCATION:	**Brook Park, Cuyahoga Co., Ohio**	TOTAL DEPTH:	**20.0 (ft)**	SURFACE ELEVATION:	**755.7 (ft)**
CLIENT:	**A.M. Kinney**				
DRILLING CO:	**EBD**	WATER LEVELS:			
DRILLING METHOD:	**4-1/2" O.D. SSA**	DURING DRILLING:	**5.5 (ft)**		
DRILLERS:	**ML**	UPON COMPLETION:	**17.0 (ft)**		
GEOLOGIST:	**JL**	AFTER COMPLETION:	**N/A**		

DEPTH (ft)	SAMPLE INFORMATION NO.	TYPE	BLOWS/0.5 (ft)	N	DESCRIPTION	DEPTH (ft)	W%	ELEV. (ft)
0.0					TOPSOIL: 4 (in)	0.3		755
	1	SS	2-3-5	8	A-6b: Brown, soft to medium stiff SILTY CLAY, some sand, little gravel and siltstone / sandstone / slag fragments, odorless, moderate to weak reaction to HCl, moist to wet. (FILL)		16	
	2	SS	3-5-3	8			15	
5.0						5.0		750
	3	SS	2-1-2	3	A-6b: Brown/gray, medium stiff, SILTY CLAY, little sand, trace gravel and siltstone fragments, odorless, no to moderate reaction to HCl, homogeneous soil structure, moist. (Possible Fill)		25	
	4	SS	2-3-3	6			21	
10.0								745
	5	ST	REC: 15.5 (in)	--			23	
15.0	6	SS	2-3-4	7			23	740
	7	SS	1-3-4	7	A-6b: Brown/gray, medium stiff, SILTY CLAY, little sand, trace gravel and siltstone / wood fragments, odorless, no reaction to HCl, homogeneous soil structure, wet.	17.5	46	
20.0					TERMINATION DEPTH: 20.0 (FT)			

BOREHOLE NUMBER

FIELD BOREHOLE LOG

B-4

PROJECT NUMBER:	**JL07675**	DATE BEGUN:	**04/18/08**	DATE COMPLETED:	**04/18/08**
PROJECT NAME:	**NASA GRC Main Gate Security Upgrade**	STATION:	**--**	OFFSET:	**--**
LOCATION:	**Brook Park, Cuyahoga Co., Ohio**	TOTAL DEPTH:	**15.0 (ft)**	SURFACE ELEVATION:	**751.4 (ft)**
CLIENT:	**A.M. Kinney**				
DRILLING CO:	**EBD**	WATER LEVELS:			
DRILLING METHOD:	**4-1/2" O.D. SSA**	DURING DRILLING:	**Not Encountered**		
DRILLERS:	**ML**	UPON COMPLETION:	**Not Encountered**		
GEOLOGIST:	**JL**	AFTER COMPLETION:	**N/A**		

DEPTH (ft)	SAMPLE INFORMATION NO.	TYPE	BLOWS/0.5 (ft)	N	DESCRIPTION	DEPTH (ft)	W%	ELEV. (ft)
0.0	1	SS	4-4-4	8	TOPSOIL: 12 (in).			
					A-6a: Brown, medium stiff to stiff SILT AND CLAY, some sand, trace gravel and sandstone / siltstone / slag fragments, odorless, moderate to weak reaction to HCl, moist. (FILL)	1.0	17	750
	2	SS	2-4-6	10			22	
5.0	3	ST	REC: 11 (in)	--	A-4a: Brown, very stiff to hard SANDY SILT, little gravel and siltstone / sandstone fragments, odorless, no to weak reaction to HCl, homogeneous soil structure, moist.	5.0	17	
	4	SS	8-13-14	27			13	745
	5	SS	9-14-22	36			13	
10.0	6	SS	22-33-31	50+			10	740
					DxSH: DECOMPOSED SHALE, gray.	11.9		
	7	SS	16-24-26	50			10	
15.0					TERMINATION DEPTH: 15.0 (FT)			

BOREHOLE NUMBER

FIELD BOREHOLE LOG

B-5

PROJECT NUMBER:	**JL07675**	DATE BEGUN:	**04/18/08**	DATE COMPLETED:	**04/18/08**
PROJECT NAME:	**NASA GRC Main Gate Security Upgrade**	STATION:	**--**	OFFSET:	**--**
LOCATION:	**Brook Park, Cuyahoga Co., Ohio**	TOTAL DEPTH:	**19.5 (ft)**	SURFACE ELEVATION:	**753.2 (ft)**
CLIENT:	**A.M. Kinney**				
DRILLING CO:	**EBD**	WATER LEVELS:			
DRILLING METHOD:	**4-1/2" O.D. SSA**	DURING DRILLING:	**Not Encountered**		
DRILLERS:	**ML**	UPON COMPLETION:	**Not Encountered**		
GEOLOGIST:	**JL**	AFTER COMPLETION:	**N/A**		

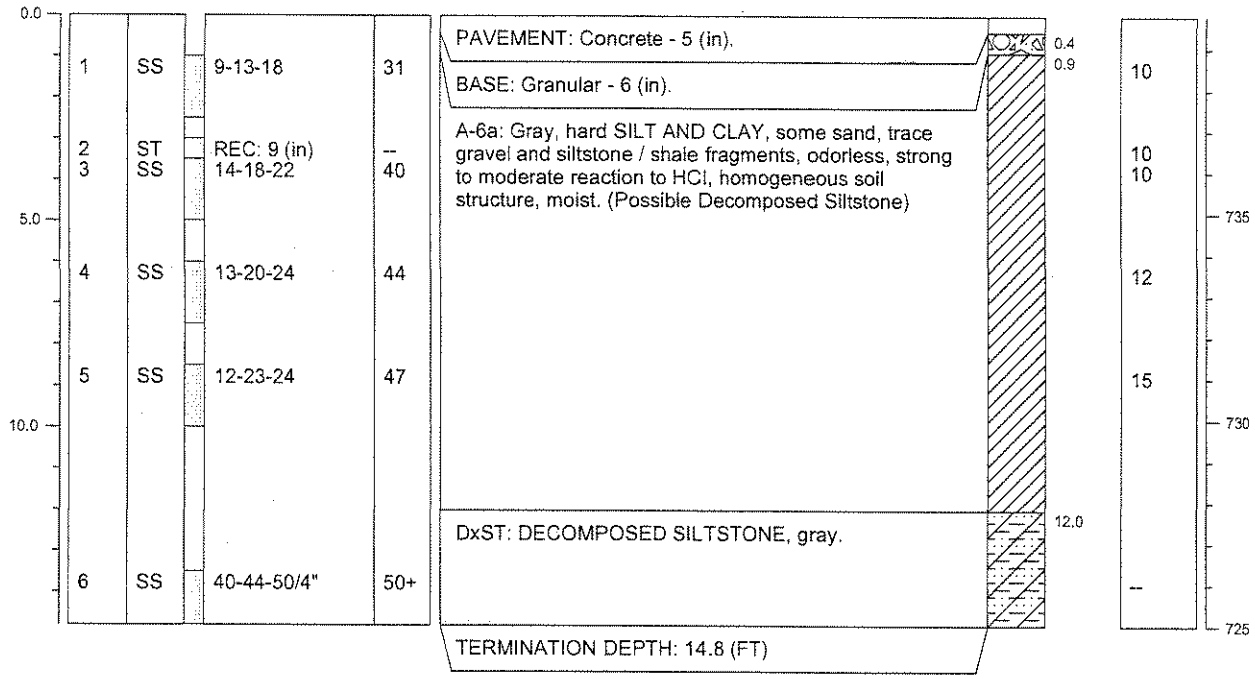
DEPTH (ft)	SAMPLE INFORMATION NO.	TYPE	BLOWS/0.5 (ft)	N	DESCRIPTION	DEPTH (ft)	W%	ELEV. (ft)
0.0	1	SS	3-5-9	14	TOPSOIL: 7 (in)	0.6	17	750
					A-6b: Brown, stiff to hard SILTY CLAY, little sand, trace gravel and sandstone / siltstone / chert fragments, odorless, moderate reaction to HCl, homogeneous soil structure, moist. (Possible Decomposed Shale)			
	2	SS	6-12-13	25			16	
5.0	3	SS	10-19-20	39			16	745
	4	SS	9-17-21	38			12	
10.0					DxSh: DECOMPOSED SHALE, gray/brown.	11.0		740
	5	SS	20-21-30	50+			10	
15.0								735
	6	SS	38-53/6	50+			8	
					TERMINATION DEPTH: 19.5 (FT)			

BOREHOLE NUMBER

FIELD BOREHOLE LOG

B-6

PROJECT NUMBER:	**JL07675**	DATE BEGUN:	**04/21/08**	DATE COMPLETED:	**04/21/08**
PROJECT NAME:	**NASA GRC Main Gate Security Upgrade**	STATION:	**--**	OFFSET:	**--**
LOCATION:	**Brook Park, Cuyahoga Co., Ohio**	TOTAL DEPTH:	**14.8 (ft)**	SURFACE ELEVATION:	**739.8 (ft)**
CLIENT:	**A.M. Kinney**				
DRILLING CO:	**EBD**	WATER LEVELS:			
DRILLING METHOD:	**4-1/2" O.D. SSA**	DURING DRILLING:	**Not Encountered**		
DRILLERS:	**ML**	UPON COMPLETION:	**Not Encountered**		
GEOLOGIST:	**JL**	AFTER COMPLETION:	**N/A**		



BOREHOLE NUMBER

FIELD BOREHOLE LOG

B-7

PROJECT NUMBER:	**JL07675**	DATE BEGUN:	**04/21/08**	DATE COMPLETED:	**04/21/08**
PROJECT NAME:	**NASA GRC Main Gate Security Upgrade**	STATION:	**--**	OFFSET:	**--**
LOCATION:	**Brook Park, Cuyahoga Co., Ohio**	TOTAL DEPTH:	**15.0 (ft)**	SURFACE ELEVATION:	**752.8 (ft)**
CLIENT:	**A.M. Kinney**				
DRILLING CO:	**EBD**	WATER LEVELS:			
DRILLING METHOD:	**4-1/2" O.D. SSA**	DURING DRILLING:	**Not Encountered**		
DRILLERS:	**ML**	UPON COMPLETION:	**Not Encountered**		
GEOLOGIST:	**JL**	AFTER COMPLETION:	**N/A**		

DEPTH (ft)	SAMPLE INFORMATION NO.	TYPE	BLOWS/0.5 (ft)	N	DESCRIPTION	DEPTH (ft)	W%	ELEV. (ft)
0.0	1	SS	2-3-8	11	TOPSOIL: 6 (in)	0.5	17	750
					A-6a: Brown, stiff to very stiff SILT AND CLAY, odorless, strong reaction to HCl, homogeneous soil structure, moist.			
	2	SS	7-11-14	25			18	
5.0	3	ST	REC: 12 (in).	--	A-7-6: Brown, hard CLAY and silt, trace sand, moderate reaction to HCl, homogeneous soil structure, moist. (Possible decomposed shale or siltstone)	5.0	21	
	4	SS	8-20-26	46		6.0	14	
					DxST: DECOMPOSED SILTSTONE, gray.			745
	5	SS	9-22-22	44			13	
10.0								
	6	SS	24-30-44	50+			11	740
15.0					TERMINATION DEPTH: 15.0 (FT)			

BOREHOLE NUMBER

FIELD BOREHOLE LOG

B-8

PROJECT NUMBER:	**JL07675**	DATE BEGUN:	**04/21/08**	DATE COMPLETED:	**04/21/08**
PROJECT NAME:	**NASA GRC Main Gate Security Upgrade**	STATION:	**--**	OFFSET:	**--**
LOCATION:	**Brook Park, Cuyahoga Co., Ohio**	TOTAL DEPTH:	**10.0 (ft)**	SURFACE ELEVATION:	**735.6 (ft)**
CLIENT:	**A.M. Kinney**				
DRILLING CO:	**EBD**	WATER LEVELS:			
DRILLING METHOD:	**4-1/2" O.D. SSA**	DURING DRILLING:	**Not Encountered**		
DRILLERS:	**ML**	UPON COMPLETION:	**Not Encountered**		
GEOLOGIST:	**JL**	AFTER COMPLETION:	**N/A**		

DEPTH (ft)	SAMPLE INFORMATION NO.	TYPE	BLOWS/0.5 (ft)	N	DESCRIPTION	DEPTH (ft)	W%	ELEV. (ft)
0.0					PAVEMENT: Concrete - 5 (in).	0.4		735
	1	SS	10-13-19	32	BASE: Granular - 6 (in).	0.9	12	
	2	SS	13-20-23	43	A-6a: Gray, hard SILT AND CLAY, little sand, trace gravel and siltstone fragments, odorless, moderate to weak reaction to HCl, homogeneous soil structure, moist. (Possible decomposed siltstone)		12	
5.0								730
	3	SS	47-39-23	50+	DxST: DECOMPOSED SILTSTONE, dark gray.	6.0	--	
	4	SS	17-27-37	50+			--	
10.0					TERMINATION DEPTH: 10.0 (FT)			

Project: NASA GRC Main Gate Security Project

JL07675

Client: A. M. Kinney, Inc.

LABORATORY TEST SUMMARY

7/2/2008

Boring Number	Sample Number	Depth (ft)	Moisture Content (%)	Percent Passing (by weight) 3/8"	#4	#10	#40	#100	#200	Particle Size Distribution Gravel	Sand Cor.	Sand Fine	Silt	Clay	Fines	Atterberg Limits LL	PL	PI	ODOT Classification
R-1	1	1.0	15	97	91	82	67	60	56	18	15	11	30	26	56	32	21	11	A-6a
	2 (1)	2.0	19	Brown, SILTY CLAY															Visual
	3	3.5	15	100	98	95	87	80	75	5	8	12	--	--	75	37	19	18	A-6b
	4	6.0	15	Brown, SILTY CLAY															Visual
	5	8.5	16	Brown, SILTY CLAY															Visual
R-2	1	1.0	19	98	97	93	85	74	67	7	8	18	--	--	67	29	18	11	A-6a
	2	3.5	20	100	97	91	78	67	63	9	13	15	31	32	63	33	18	14	A-6a
	3	6.0	23	Brown, SILT AND CLAY															Visual
	4	8.5	22	Brown, SILT AND CLAY															Visual
	5 (1)	10.0	21	96	95	93	88	83	79	7	5	9	30	49	79	41	19	21	A-7-6
R-3	1	1.0	21	Brown, SILT AND CLAY															Visual
	2	3.5	16	98	96	92	86	78	75	8	6	11	--	--	75	--	--	--	A-6a
	3	5.0	17	99	98	96	89	83	79	4	7	10	31	48	79	36	19	17	A-6b
	4	6.0	16	99	97	93	83	76	76	7	10	7	--	--	76	35	21	14	A-6a
	5	8.5	16	Light brown, SILT AND CLAY															Visual
	6	11.0	19	100	100	100	100	99	65	0	0	35	--	--	65	NP	NP	NP	A-4a
	7	13.5	20	Brown, SILT AND CLAY															Visual
R-4	1	1.0	18	99	97	95	89	84	81	5	6	8	--	--	81	36	20	16	A-6b
	2	3.5	16	99	98	95	88	83	79	5	7	9	43	36	79	23	17	6	A-4a
	3	6.0	13	Brown, SILT AND CLAY															Visual
	4	8.5	13	Brown and gray, SANDY SILT															Visual
R-5	1	1.0	16	99	96	92	84	77	72	8	8	12	29	43	72	31	19	11	A-6a
	2	3.5	18	100	99	98	93	89	86	2	5	7	--	--	86	31	19	11	A-6a
	3	6.0	12	Brown, SILT AND CLAY															Visual
	4	8.5	11	Brown and gray, SILT AND CLAY															Visual
R-6	1	1.0	13	95	85	68	47	37	33	32	21	14	--	--	33	--	--	--	A-2-6
	2 (1)	2.0	12	97	97	94	84	78	74	6	10	10	37	37	74	27	16	11	A-6a
	3	3.5	17	99	97	94	87	82	79	6	7	8	27	52	79	37	21	16	A-6b
	4	6.0	16	Brown, SILT AND CLAY															Visual
	5	8.5	10	Gray, SILT AND CLAY															Visual

"Fines" = Silt and clay combined
Sample depths indicate top of sample interval
Notes: (1) Shelby tube obtained from offset boring

Notes: (1) Shelby tube obtained from offset boring

Project: NASA GRC Main Gate Security Project

JL07675

Client: A. M. Kinney, Inc.

LABORATORY TEST SUMMARY

7/2/2008

Boring Number	Sample Number	Depth (ft)	Moisture Content (%)	Percent Passing (by weight) 3/8"	#4	#10	#40	#100	#200	Particle Size Distribution Gravel	Sand Cor.	Sand Fine	Silt	Clay	Fines	Atterberg Limits LL	PL	PI	ODOT Classification
B-1	1	1.0	16	Brown, SILT AND CLAY															Visual
	2	3.5	17	96	93	88	79	72	67	12	9	12	--	--	67	33	19	14	A-6a
	3	6.0	16	Brown, SILT AND CLAY															Visual
	4	8.0	22	100	97	95	89	83	78	5	6	11	--	--	78	37	20	17	A-6b
	5	10.0	23	98	96	94	88	82	77	6	6	11	--	--	77	--	--	--	A-6b
	6	13.5	25	Brownish gray, SILTY CLAY															Visual
	7	18.0	28	100	100	100	100	99	98	0	0	2	--	--	98	52	26	25	A-7-6
	8	19.7	18	Gray, CLAY															Visual
	9T	23.5	24	99	98	98	98	97	96	2	0	2	72	24	96	NP	NP	NP	A-4b
	9B	24.5	11	97	86	64	42	30	25	36	22	17	--	--	25	--	--	--	A-1-b
	10	28.5	7	Dark gray, DECOMPOSED SILTSTONE															Visual
B-2	1	1.0	16	Brown, SILTY CLAY															Visual
	2	3.5	19	98	93	87	72	62	58	13	15	14	--	--	58	35	19	16	A-6b
	3	6.0	16	Grayish brown, SILT AND CLAY															Visual
	4	8.5	19	94	89	88	81	80	76	12	7	5	--	--	76	34	20	14	A-6a
	5	13.5	19	Grayish brown, SILT AND CLAY															Visual
	6	18.5	20	Grayish brown, SILT AND CLAY															Visual
	7T	24.0	22	98	97	96	93	65	47	4	3	46	32	15	47	NP	NP	NP	A-4a
	7B	25.0	12	Gray, SILT AND CLAY															Visual
B-3	1	1.0	16	Brown, SILTY CLAY															Visual
	2	3.5	15	96	91	83	72	60	56	17	11	16	--	--	56	--	--	--	A-6b
	3	6.0	25	97	93	89	72	63	58	11	17	14	--	--	58	39	19	20	A-6b
	4	8.5	21	Brownish gray, SILTY CLAY															Visual
	5	13.0	23	99	98	95	88	81	77	5	7	11	--	--	77	40	20	20	A-6b
	6	15.0	23	Brownish gray, SILTY CLAY															Visual
	7	18.5	46	Gray, SILTY CLAY															Visual
B-4	1	1.0	17	99	98	95	86	76	71	5	9	15	--	--	71	32	19	12	A-6a
	2	3.5	22	Brown, SILT AND CLAY															Visual
	3	5.0	17	99	97	90	77	66	58	10	13	19	--	--	58	23	18	5	A-4a
	4	6.3	13	Brown, SANDY SILT															Visual
	5	8.5	13	99	96	89	76	68	63	11	13	13	--	--	63	--	--	--	A-4a
	6	11.0	10	Gray, DECOMPOSED SHALE															Visual
	7	13.5	10	Gray, DECOMPOSED SHALE															Visual
B-5	1	1.0	17	Brown, SILTY CLAY															Visual
	2	3.5	16	99	96	93	85	80	76	7	8	9	--	--	76	38	21	17	A-6b
	3	6.0	16	Brown, SILTY CLAY															Visual
	4	8.5	12	Brown/gray, SILTY CLAY															Visual
	5	13.5	10	Gray/brown, DECOMPOSED SHALE															Visual
	6	18.5	8	Gray/brown, DECOMPOSED SHALE															Visual

"Fines" = Silt and clay combined

Sample depths indicate top of sample interval

Notes: (1) Shelby tube obtained from offset boring

Notes: (1) Shelby tube obtained from offset boring

Project: NASA GRC Main Gate Security Project

JL07675

Client: A. M. Kinney, Inc.

LABORATORY TEST SUMMARY

7/2/2008

Boring Number	Sample Number	Depth (ft)	Moisture Content (%)	Percent Passing (by weight) 3/8"	#4	#10	#40	#100	#200	Particle Size Distribution Gravel	Sand Cor.	Sand Fine	Silt	Clay	Fines	Atterberg Limits LL	PL	PI	ODOT Classification
B-6	1	1.0	10	Gray, SILT AND CLAY															Visual
	2	3.0	10	100	98	94	84	77	73	6	10	11	--	--	73	--	--	--	A-6a
	3	3.5	10	Gray, SILT AND CLAY															Visual
	4	6.0	12	Gray, SILT AND CLAY															Visual
	5	8.5	15	Gray, SILT AND CLAY															Visual
	6	13.5	--	Gray, DECOMPOSED SILTSTONE															Visual
B-7	1	1.0	17	Gray, SILT AND CLAY															Visual
	2	3.5	18	Gray, SILT AND CLAY															Visual
	3	5.0	21	100	100	100	99	98	97	0	1	2	--	--	97	44	24	20	A-7-6
	4	6.0	14	Gray, DECOMPOSED SILTSTONE															Visual
	5	8.5	13	Gray, DECOMPOSED SILTSTONE															Visual
	6	13.5	11	Gray, DECOMPOSED SILTSTONE															Visual
B-8	1	1.5	12	100	98	96	88	83	80	4	8	8	--	--	80	29	18	11	A-6a
	2	3.5	12	Gray, SILT AND CLAY															Visual
	3	6.0	--	Dark gray, DECOMPOSED SILTSTONE															Visual
	4	8.5	--	Dark gray, DECOMPOSED SILTSTONE															Visual

"Fines" = Silt and clay combined
Sample depths indicate top of sample interval
Notes: (1) Shelby tube obtained from offset boring

Notes: (1) Shelby tube obtained from offset boring

Direct Shear Test of Soil Under Consolidated Drained Conditions ASTM (D-3080)

Project: NASA GRC Main Gate Security Upgrade
Project No: JL07675
Client: A. M. Kinney, Inc.

Testing Date: 6/17/2008
Tested by: A.M.

BORING No.	DEPTH (ft.)	MOISTURE CONTENT (%)	WET DENSITY (pcf)	DRY DENSITY (pcf)	COHESION (psf)	ANGLE OF INTERNAL FRICTION (degree)	SOIL CLASSIFICATION (ODOT)
B-1	8.0	21.0	128.7	106.4	552	27.9	A-6b
B-7	5.0	17.5	134.9	114.8	1248	19.4	A-7-6

PROJECT: NASA GRC Main Gate Security Upgrade

CLIENT: A.M. Kinney

J&L PROJ. No.: JL07675

TESTED BY: AM

TESTING DATE: 06/10/08

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS (ASTM D-2166)

BORING No.	SAMPLE DEPTH (ft.)	MOISTURE CONTENT (%)	WET DENSITY (pcf)	DRY DENSITY (pcf)	PERCENT STRAIN AT FAILURE	UNCONFINED COMPRESSIVE STRENGTH (psf)	ESTIMATED COHESION (psf)	SOIL CLASSIFICATION (Visual)
B-1	8.3	21.0	128.7	106.4	18.6	2535.2	1268	A-6b
B-3	14.2	21.0	131.0	108.3	14.4	1344.8	672	A-6b
B-4	5.5	19.2	131.0	109.9	9.1	4309.6	2155	A-4a
B-7	5.2	17.5	134.9	114.8	6.1	3354.9	1677	A-7-6

Permeability Test Report

JL07675

Client: A.M. Kinney

Sample Data:

Boring Number	Sample Number	Sample Type	Depth (ft)
R-2	1	SS	10'-12'

$K_{20°C}$ = 1.60E-08 cm/sec

Test Conditions:

Permeant Liquid	Back Pressure	Hydraulic Gradient	Consolidation Stress Max (psi)	Consolidation Stress Min (psi)	Total Test Time (min)	Total Flow (cc)
De-aired/De-ionized water	50 psi	5 psi	6	2	1920	4.2

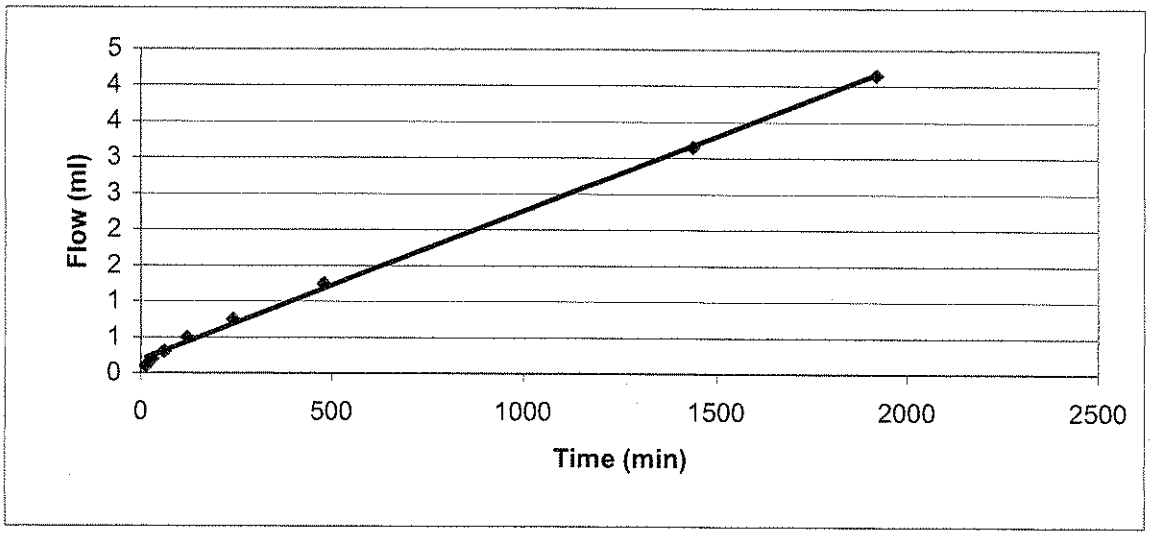
Initial Sample Data:

Moisture (%)	Saturation (%)	Diameter (cm)	Length (cm)	Area (cm^2)	Wet Density (pcf)	Dry Density (pcf)
21.8	100.6	7.160	6.465	40.27	130.3	107.1

Final Sample Data

Moisture (%)	Saturation (%)	Diameter (cm)	Length (cm)	Area (cm^2)	Wet Density (pcf)	Dry Density (pcf)
21.1	100.0	7.209	6.371	40.81	131.3	108.4

Reading	Time (h:m)	Chamber	Upper	Lower	Flow	K_{20} (cm/s)
1	0:00	14.3	24.7	0.3	0.0	--
2	0:15	14.2	24.6	0.4	0.1	4.93E-08
3	0:30	14.2	24.5	0.5	0.2	4.93E-08
4	1:00	14.1	24.4	0.6	0.3	3.70E-08
5	2:00	14.0	24.2	0.8	0.5	3.08E-08
6	4:00	14.0	24.0	1.1	0.8	2.31E-08
7	8:00	13.9	23.5	1.6	1.3	1.93E-08
8	24:00	14.2	21.7	3.6	3.2	1.62E-08
9	32:00	14.3	20.7	4.6	4.2	1.60E-08



Permeability Test Report

JL07675

Client: A.M. Kinney

Sample Data:

Boring Number	Sample Number	Sample Type	Depth (ft)
R-3	1	SS	5.0' - 6.0'

$K_{20°C}$ = 4.71E-08 cm/sec

Test Conditions:

Permeant Liquid	Back Pressure	Hydraulic Gradient	Consolidation Stress Max (psi)	Consolidation Stress Min (psi)	Total Test Time (min)	Total Flow (cc)
De-aired/De-ionized water	50 psi	5 psi	6	2	1920	13.9

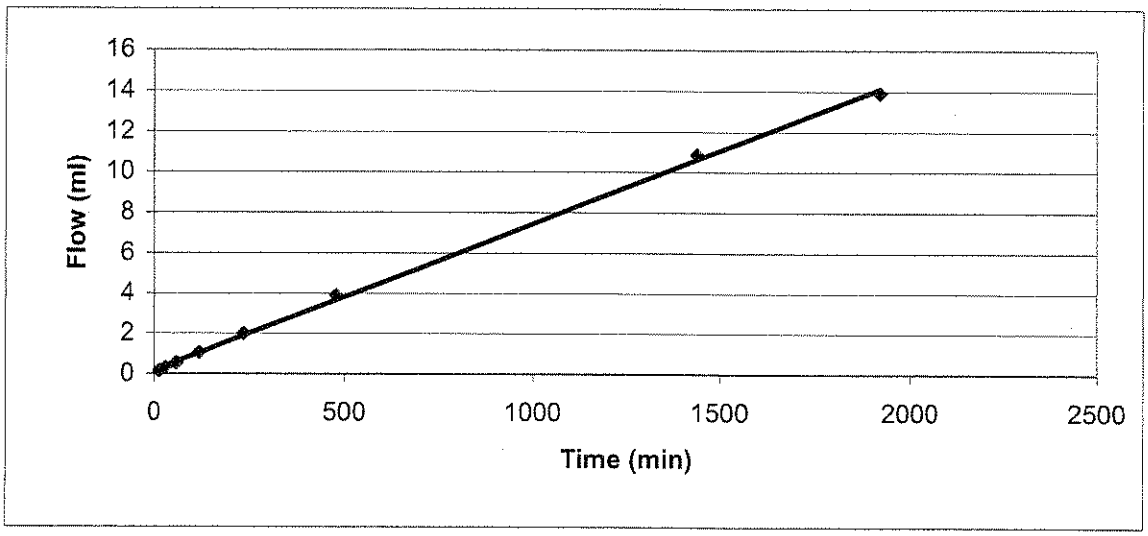
Initial Sample Data:

Moisture (%)	Saturation (%)	Diameter (cm)	Length (cm)	Area (cm^2)	Wet Density (pcf)	Dry Density (pcf)
14.8	97.4	7.173	5.454	40.41	135.2	117.8

Final Sample Data

Moisture (%)	Saturation (%)	Diameter (cm)	Length (cm)	Area (cm^2)	Wet Density (pcf)	Dry Density (pcf)
17.4	100.0	7.124	5.475	39.86	139.7	119.0

Reading	Time (h:m)	Chamber	Upper	Lower	Flow	K_{20} (cm/s)
1	0:00	11.5	24.4	0.9	0.0	–
2	0:15	11.5	24.3	1.1	0.1	6.51E-08
3	0:30	11.5	24.1	1.2	0.3	6.51E-08
4	1:00	11.5	23.9	1.5	0.6	5.96E-08
5	2:00	11.4	23.4	2.0	1.1	5.69E-08
6	4:00	11.6	22.5	3.0	2.0	5.42E-08
7	8:00	11.5	20.6	4.9	3.9	5.29E-08
8	24:00	11.9	13.8	12.0	10.9	4.90E-08
9	32:00	12.1	10.8	15.1	13.9	4.71E-08



Permeability Test Report

JL07675 Client: A.M. Kinney

Sample Data:

Boring Number	Sample Number	Sample Type	Depth (ft)
B-1	1	SS	8.0'-10.0'

$K_{20°C}$ = 4.02E-08 cm/sec

Test Conditions:

Permeant Liquid	Back Pressure	Hydraulic Gradient	Consolidation Stress Max (psi)	Consolidation Stress Min (psi)	Total Test Time (min)	Total Flow (cc)
De-aired/De-ionized water	50 psi	5 psi	6	2	2880	17.4

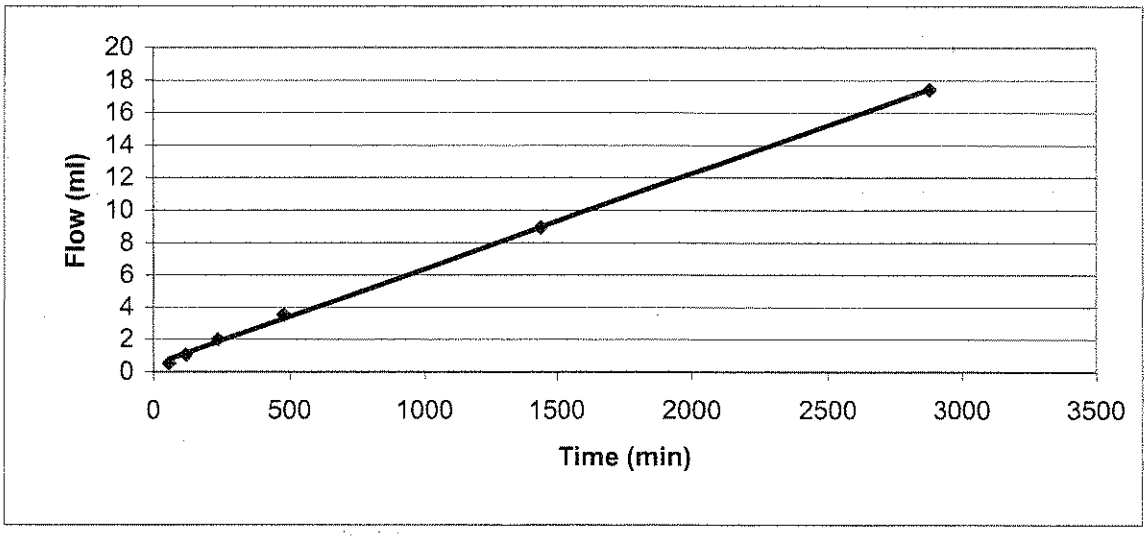
Initial Sample Data:

Moisture (%)	Saturation (%)	Diameter (cm)	Length (cm)	Area (cm^2)	Wet Density (pcf)	Dry Density (pcf)
16.4	98.5	7.183	5.738	40.52	140.2	120.4

Final Sample Data

Moisture (%)	Saturation (%)	Diameter (cm)	Length (cm)	Area (cm^2)	Wet Density (pcf)	Dry Density (pcf)
17.9	100.0	7.232	5.767	41.08	139.4	118.2

Reading	Time (h:m)	Chamber	Upper	Lower	Flow	K_{20} (cm/s)
1	0:00	10.4	24.8	0.4	0.0	--
2	1:00	10.1	24.3	1.0	0.6	6.10E-08
3	2:00	10.3	23.8	1.5	1.1	5.96E-08
4	4:00	10.4	22.9	2.5	2.0	5.54E-08
5	8:00	10.4	21.4	4.1	3.6	4.92E-08
6	24:00	11.0	16.0	9.5	9.0	4.13E-08
7	48:00	11.3	7.4	17.8	17.4	4.02E-08



rev(7/12/98)

J&L Laboratories

Permeability Test Report

JL07675

Client: A.M. Kinney

Sample Data:

Test Pit Number	Sample Number	Sample Type	Depth (ft)
R-6	1	SS	3.0'-3.5'

$K_{20°C}$ = 2.07E-08 cm/sec

Test Conditions:

Permeant Liquid	Back Pressure	Hydraulic Gradient	Consolidation Stress Max (psi)	Consolidation Stress Min (psi)	Total Test Time (min)	Total Flow (cc)
De-aired/De-ionized water	50 psi	5 psi	6	2	5760	19.8

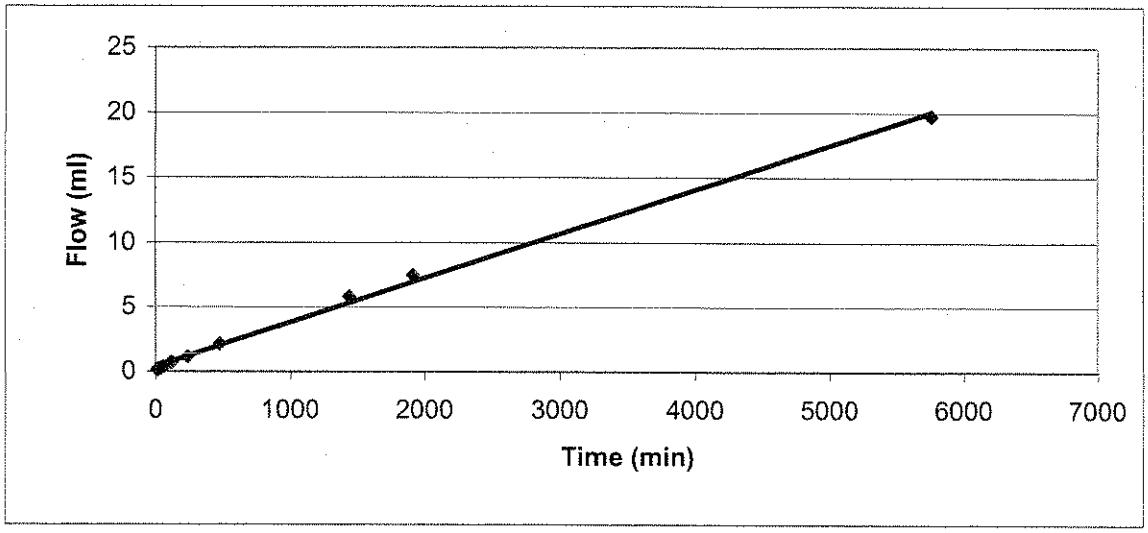
Initial Sample Data:

Moisture (%)	Saturation (%)	Diameter (cm)	Length (cm)	Area (cm^2)	Wet Density (pcf)	Dry Density (pcf)
9.5	97.4	7.225	5.032	40.99	139.5	127.4

Final Sample Data

Moisture (%)	Saturation (%)	Diameter (cm)	Length (cm)	Area (cm^2)	Wet Density (pcf)	Dry Density (pcf)
12.0	100.0	7.125	5.075	39.87	145.4	129.8

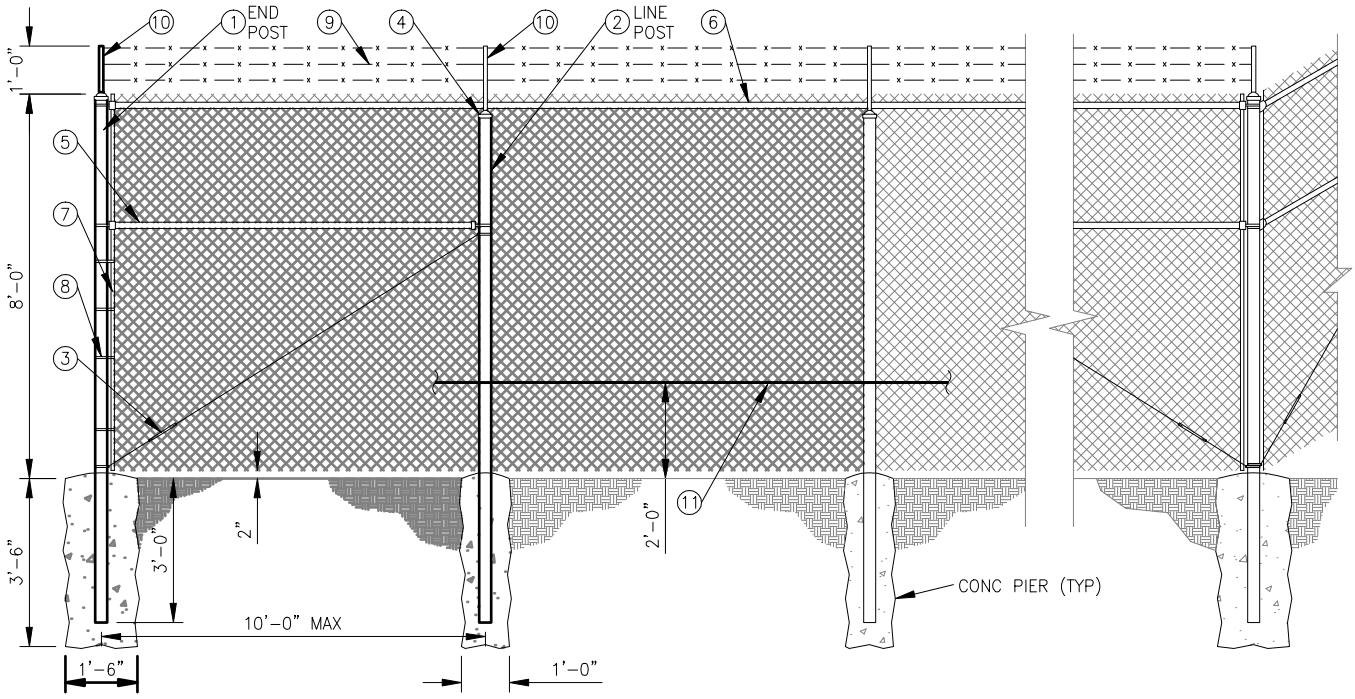
Reading	Time (h:m)	Chamber	Upper	Lower	Flow	K_{20} (cm/s)
1	0:00	16.8	24.6	0.5	0.0	--
2	0:15	16.7	24.5	0.7	0.2	6.03E-08
3	0:30	16.7	24.4	0.8	0.3	5.02E-08
4	1:00	16.6	24.3	1.0	0.4	4.02E-08
5	2:00	16.6	24.0	1.3	0.7	3.52E-08
6	4:00	16.6	23.6	1.8	1.2	2.89E-08
7	8:00	16.6	22.6	2.8	2.2	2.70E-08
8	24:00	16.9	19.0	6.5	5.8	2.43E-08
9	32:00	17.0	17.4	8.2	7.5	2.34E-08
10	96:00	17.4	4.9	20.3	19.8	2.07E-08
0						



rev(7/12/98)

REV. NO.				
DESIGN	DRAWN	SCALE	DATE	JOB NO.
TRR	TRR	AS NOTED	11/20/06	03370

A.M. Kinney, Inc.
Founded 1929
150 E. 4th STREET
CINCINNATI, OHIO 45202
513-421-2265
800-AMK-3682
FAX 513-421-2264



LEGEND		
ITEM	TUBULAR	ROLL FORMED
①	2½"OD @ 3.65#/LF	3½"x3½" @ 3.65#/LF
②	2"OD @ 2.72#/LF	2.25" H-COL @ 3.26#/LF OR 2.25" C-COL @ 2.64#/LF
③	⅜"ø TRUSS ROD & TIGHTENER	⅜"ø TRUSS ROD & TIGHTENER
④	APPROVED CAPS	NOT REQUIRED
⑤	1⅝" BRACE @ 2.27#/LF	1.25"x1.625" @ 1.35#/LF
⑥	1⅝" OD @ 2.27#/LF	1.25"x1.625" @ 1.35#/LF
⑦	3/16"x¾" FLAT STRETCHER BAR	NOT REQUIRED
⑧	BRACE BAND & TENSION BAND	NOT REQUIRED
⑨	BARBED WIRE	BARBED WIRE
⑩	BARBED WIRE ARM	BARBED WIRE ARM
⑪	½"ø CABLE (SEE NOTE)	½"ø CABLE (SEE NOTE)

NOTES:
1. FOR CRASH RESISTANT CAPABILITIES-½"ø CABLE SHALL BE ADDED AS SHOWN AND APPROPRIATELY ANCHORED.

NO	DATE	REVISIONS	BY

DRAWING TITLE
CHAIN LINK FENCE DETAIL

DRAWING NUMBER
C-007

FILE sk-fence.dwg